Electronic Version
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Claims

[c1] 1. An integrated circuit comprising:
a first voltage island having a hierarchal structure; and
a second voltage island nested within said first voltage island, said second voltage island having the same hierarchal structure as said first voltage island.

[c2] The integrated circuit of claim 1, wherein each voltage island includes one or more voltage power supplies, each selected from the group consisting of a VDDI power supply, a VDDSS power supply and a VDDN power supply.

[c3] The integrated circuit of claim 2 wherein VDDI, VDDSS and VDDN power supplies of said second voltage island may be independently coupled to VDDI, VDDSS and VDDN power supplies of said first voltage island or independently coupled to a VDDO power supply of a non-voltage island portion of said integrated circuit or independently coupled to one or more external power supplies.

[c4] The integrated circuit of claim 1, wherein said hierarchal structure includes a VDDN power supply and voltage shifting means or said VDDN power supply and fencing

means or said VDDN power supply and said voltage shifting means and said fencing means.

[c5] The integrated circuit of claim 4, wherein said communications means comprises logic latches.

[c6] The integrated circuit of claim 4, wherein said hierarchal structure further includes one or more substructures selected from the group consisting of a VDDI power distribution network, state saving means, one or more switching elements coupled between said VDDN power supply and said VDDI power distribution network, a VDDSS power supply and one or more voltage buffering circuits.

[c7] The integrated circuit of claim 6, wherein said one or more switching elements is selected from the group consisting of hard connections, voltage regulators, headers and footers.

[c8] The integrated circuit of claim 6, wherein said state saving means includes at least one state saving latch.

[c9] The integrated circuit of claim 2, further including a power management state machine, said power management state machine located in a non-voltage island portion of said integrated circuit for controlling said fencing means in said first voltage island or said second voltage island or both said first and said second voltage islands.

[c10] 10. An integrated circuit comprising:
a parent terrain; and
a hierarchal order of nested voltage islands within said parent terrain, each higher-order voltage island nested within a lower-order voltage island, each nested voltage island having the same hierarchal structure.

[c11] The integrated circuit of claim 10, wherein each nested voltage island includes one or more voltage power supplies selected from the group consisting of a VDDI power supply, a VDDSS power supply and a VDDN power supply.

[c12] The integrated circuit of claim 11, wherein VDDI, VDDSS and VDDN power supplies of a higher-order voltage island may be independently coupled to VDDI, VDDSS and VDDN power supplies of any higher-order voltage island or independently coupled to a VDDO power supply of said parent terrain or independently coupled to one or more external power supplies.

[c13] The integrated circuit of claim 10, wherein said hierarchal structure includes a VDDN power supply and voltage shifting means or said VDDN power supply and fencing means or said VDDN power supply, said voltage shifting means and said fencing means.

[c14] The integrated circuit of claim 13, wherein said communications means comprises logic latches.

[c15] The integrated circuit of claim 13, wherein said hierarchal structure further includes one or more substructures selected from the group consisting of a VDDI power distribution network, state saving means, one or more switching elements coupled between said VDDN power supply and said VDDI power distribution network, a VDDSS power supply and one or more voltage buffering circuits.

[c16] The integrated circuit of claim 15, wherein said one or more switching elements is selected from the group consisting of hard connections, voltage regulators, headers and footers.

[c17] The integrated circuit of claim 15, wherein said state saving means includes at least one state saving latch.

[c18] The integrated circuit of claim 11, further including a power management state machine adapted to control the VDDI power supply of a higher-order voltage island, said power management state machine located in a lower-order voltage island or located in said parent terrain.

[c19] 19. A method of designing an integrated circuit com-

prising:

providing a parent terrain within said integrated circuit;

placing a first voltage island having a hierarchal structure within said parent terrain; and

placing a second voltage island nested within said first voltage island, said second voltage island having the same hierarchal structure as said first voltage island.

[c20] The method of claim 19, wherein said hierarchal structure includes a VDDN power supply and voltage shifting means or said VDDN power supply and fencing means or said VDDN power supply, said voltage shifting means and said fencing means.